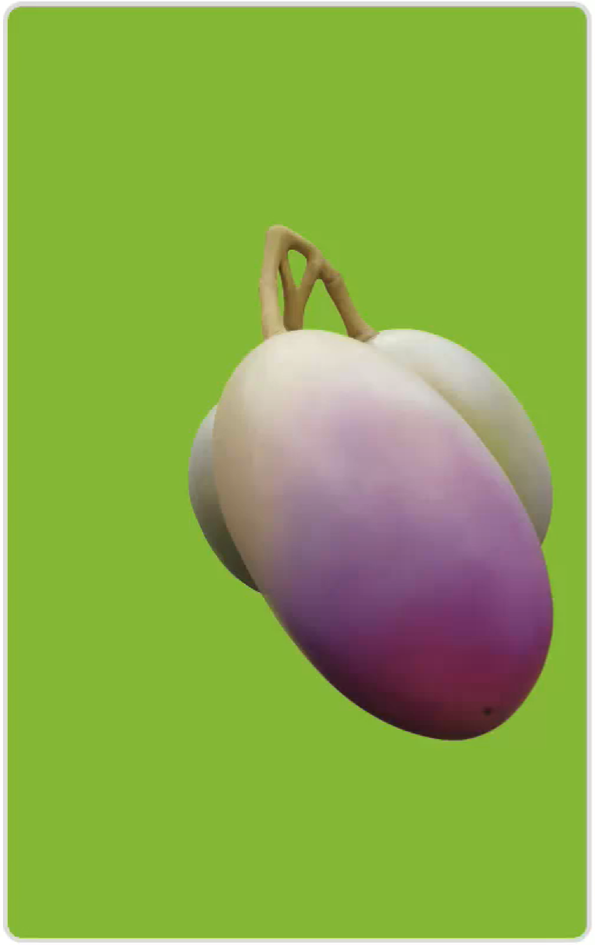
Adaptive Volumetric Mechanical Property Fields Invariant to Resolution

Rishit Dagli, Donglai Xiang, Vismay Modi, Xuning Yang,
Gavriel State, David I.W. Levin, Maria Shugrina

Adaptive Volumetric Mechanical Property Fields Invariant to Resolution

VoMP: Predicting Volumetric Mechanical Property Fields [ICLR 2026]

Step 1: Capture a Splat 📷



Drag to rotate ▪ Scroll to zoom ▪ Right click to pan

VoMP

Step 2: VoMP predicts properties 🚀

Young's Modulus

Poisson's Ratio

Density

Simulator

Step 3: Use a simulator to produce realistic interactions 🔥

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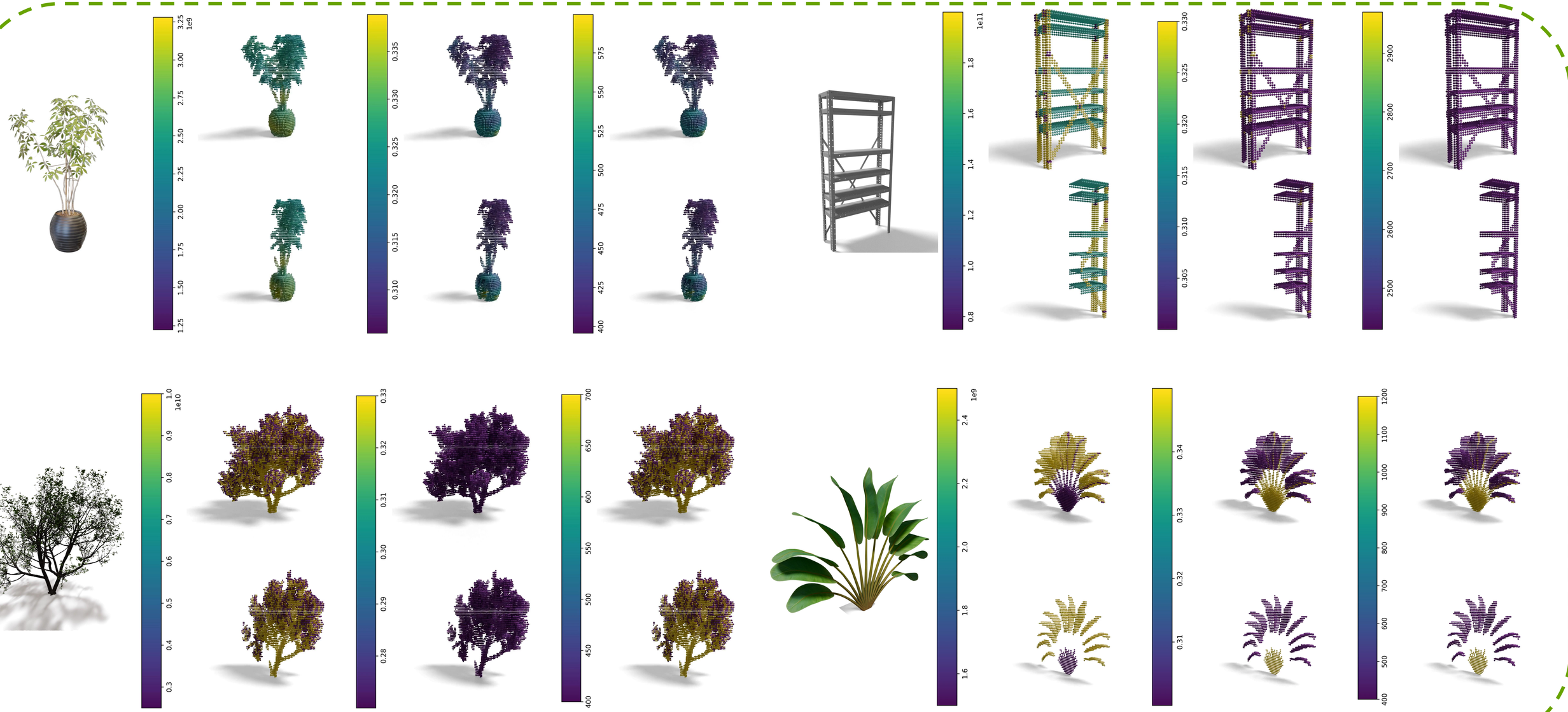

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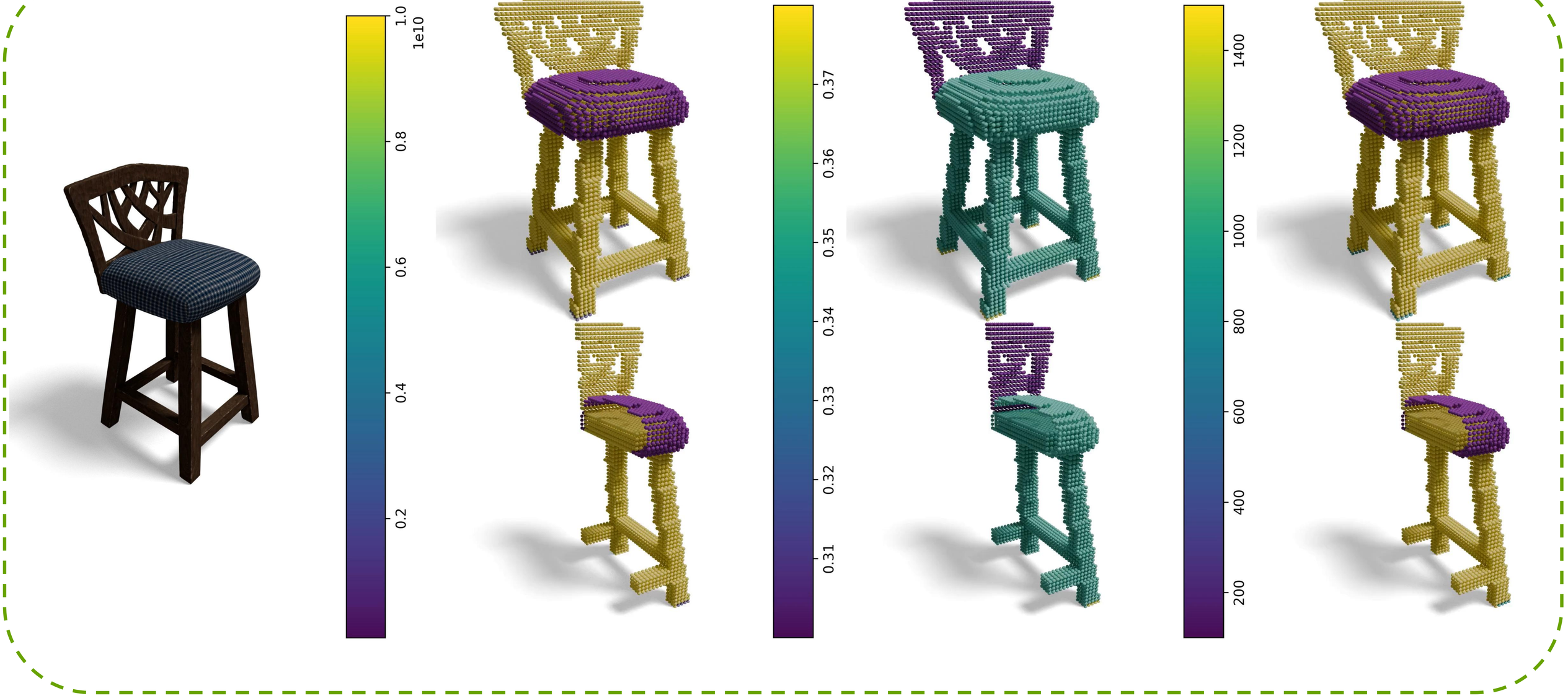

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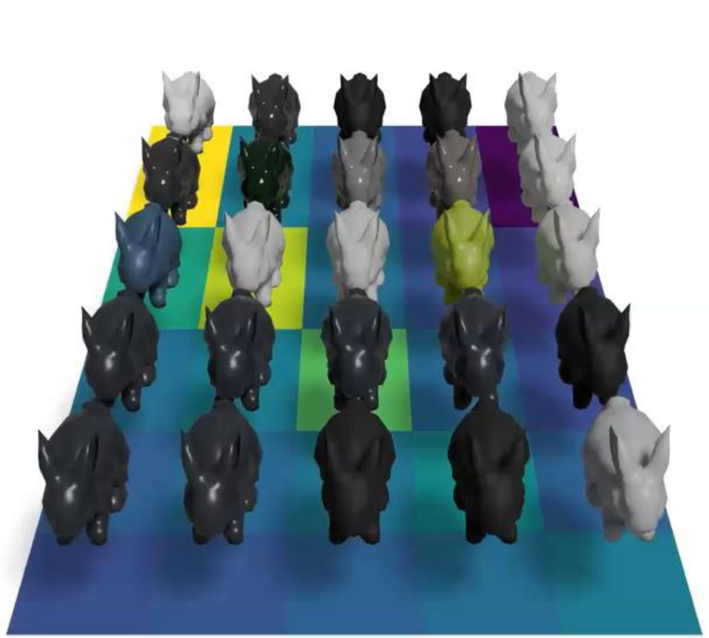
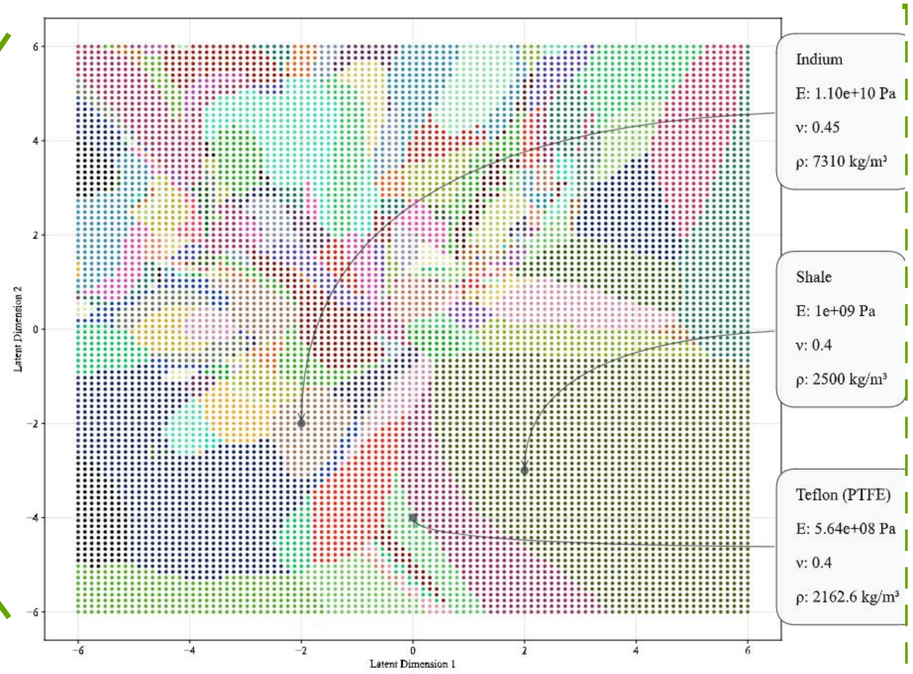
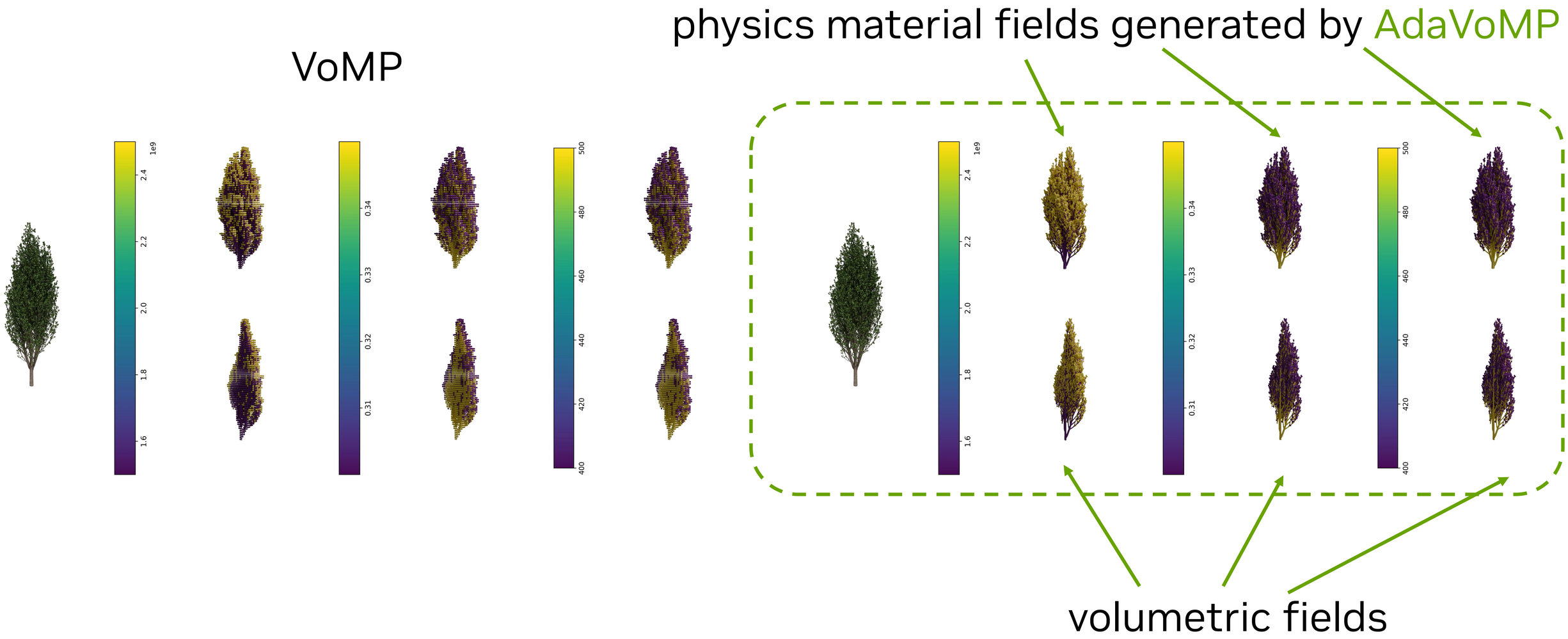





VoMP
physics material fields generated by AdaVoMP
volumetric fields
1e9
2.4
2.2
2.0
1.8
1.6
0.34
0.33
0.32
0.31
500
480
460
440
420
400

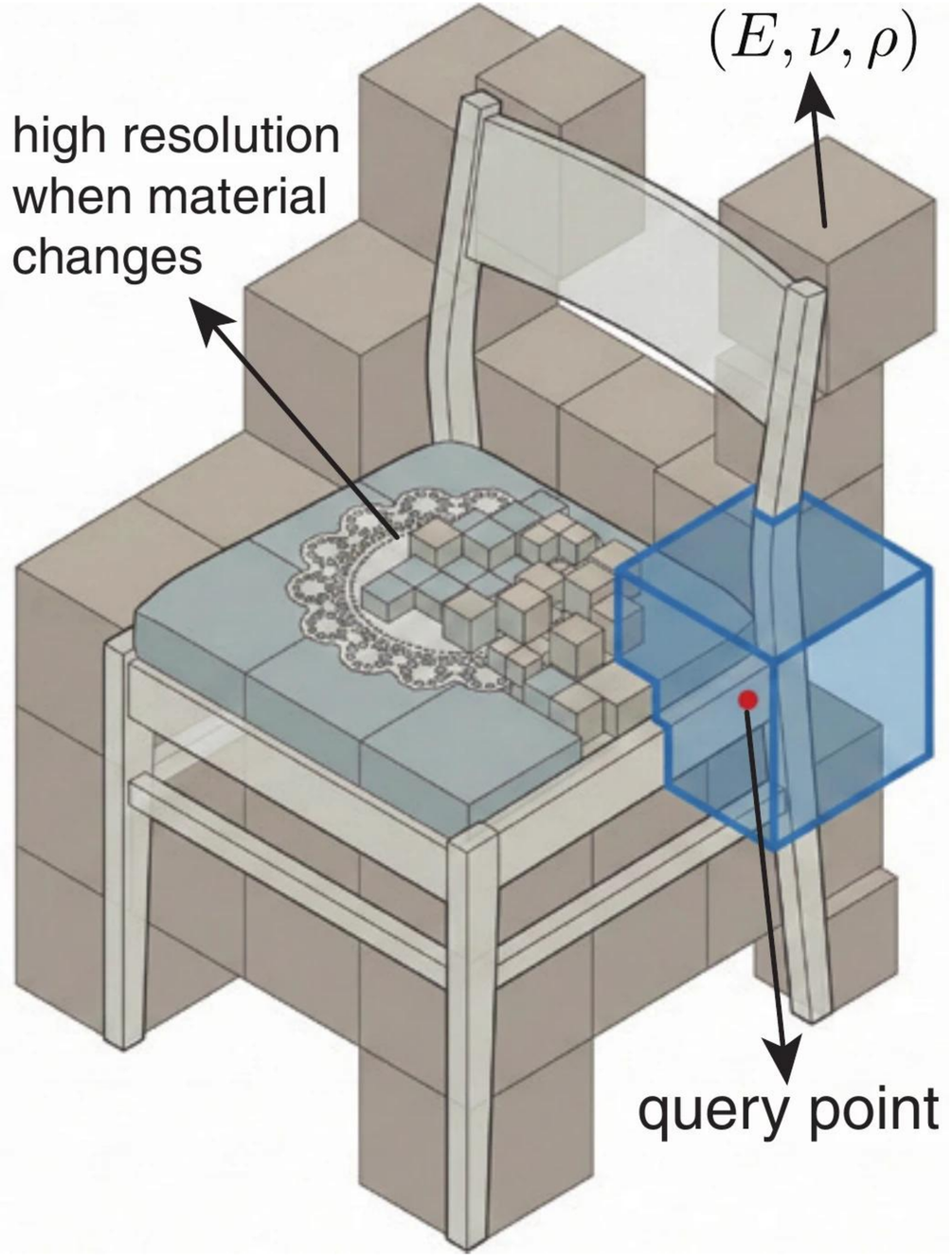

Mesh
Mesh
Gaussian Splat
Gaussian Splat

RTX 2080 Ti
0.5
1.0
1.5
2.0
2.5
1e11
0.25
0.30
0.35
0.40
0.45
2000
3000
4000
5000
6000
7000
8000

RTX 2080 Ti
HOW TO CREATE STUNNING VISUALIZATIONS

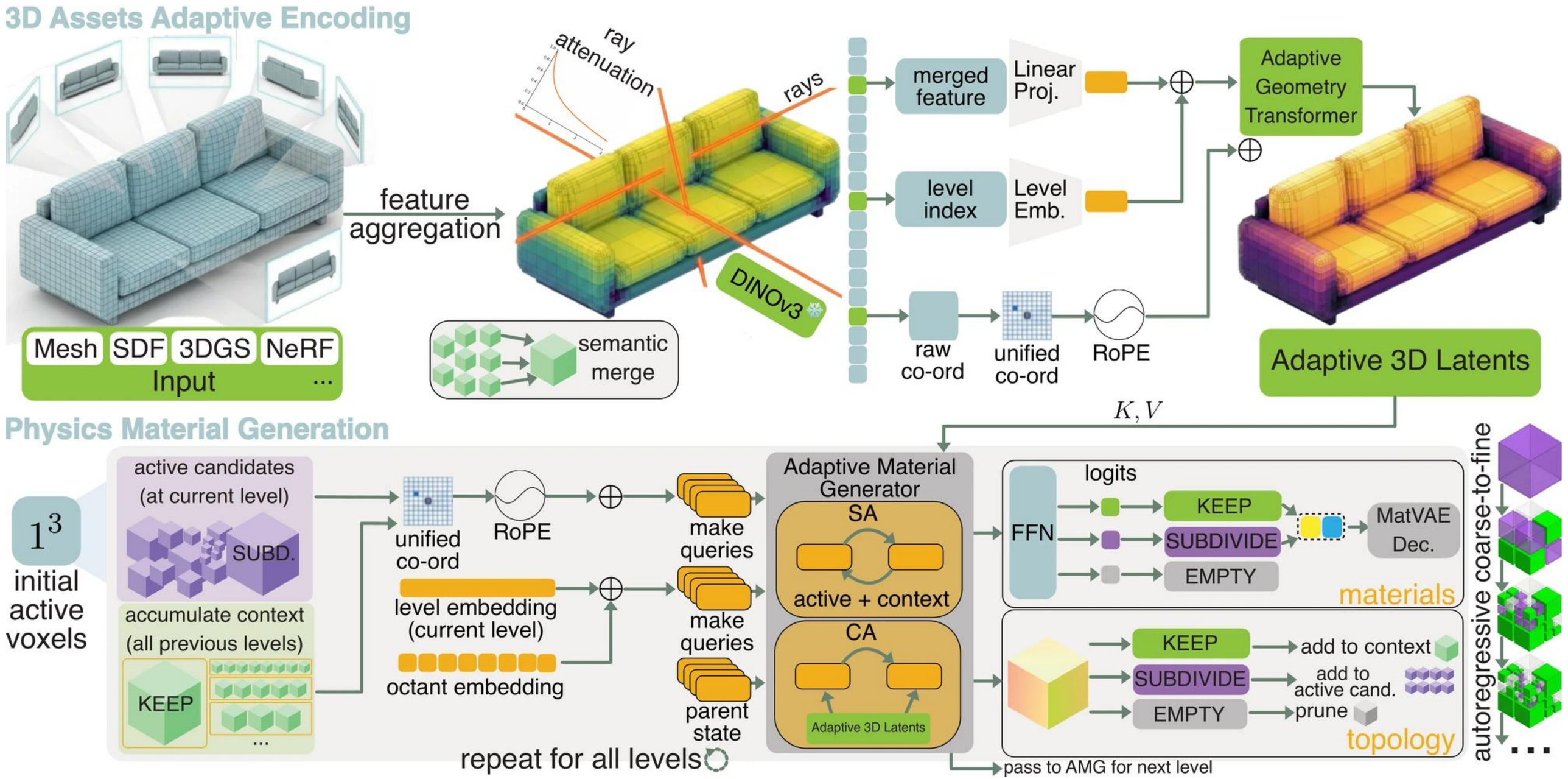
FRANKA
EMIKA

SAV: Sparse Adaptive Voxels



aggregating features

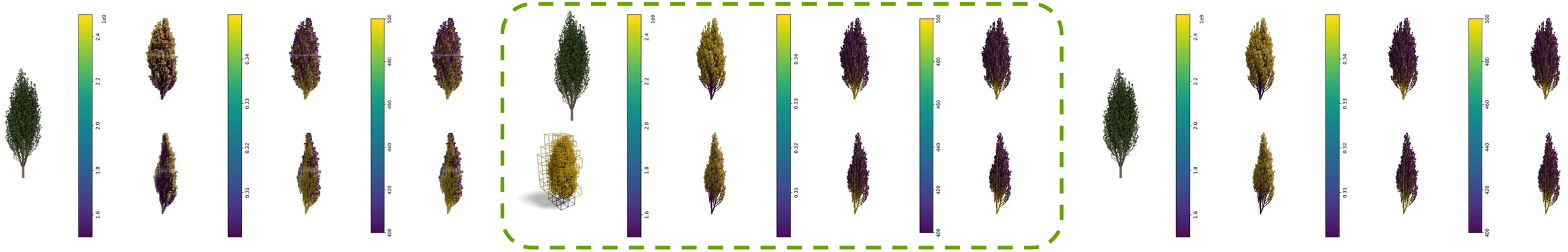
Adaptive Geometry Transformer & Adaptive Material Generator



Adaptive Geometry Transformer & Adaptive Material Generator

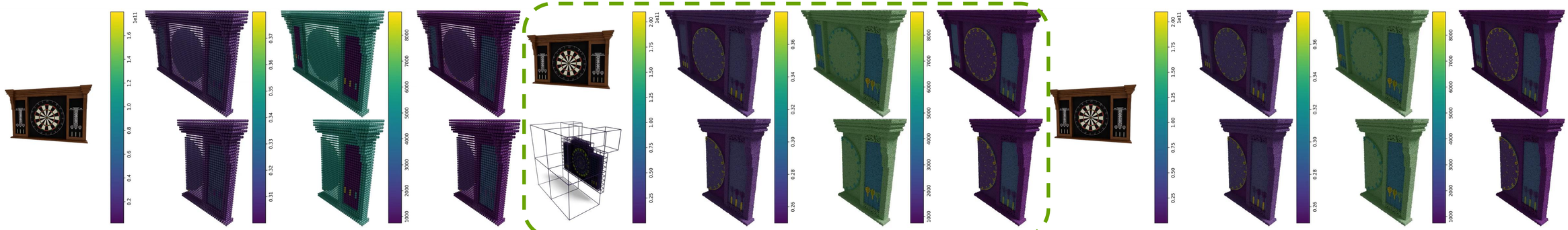
generation process for 1^3 → 4^3

NeRF2Physics PUGS Phys4DGen Pixie

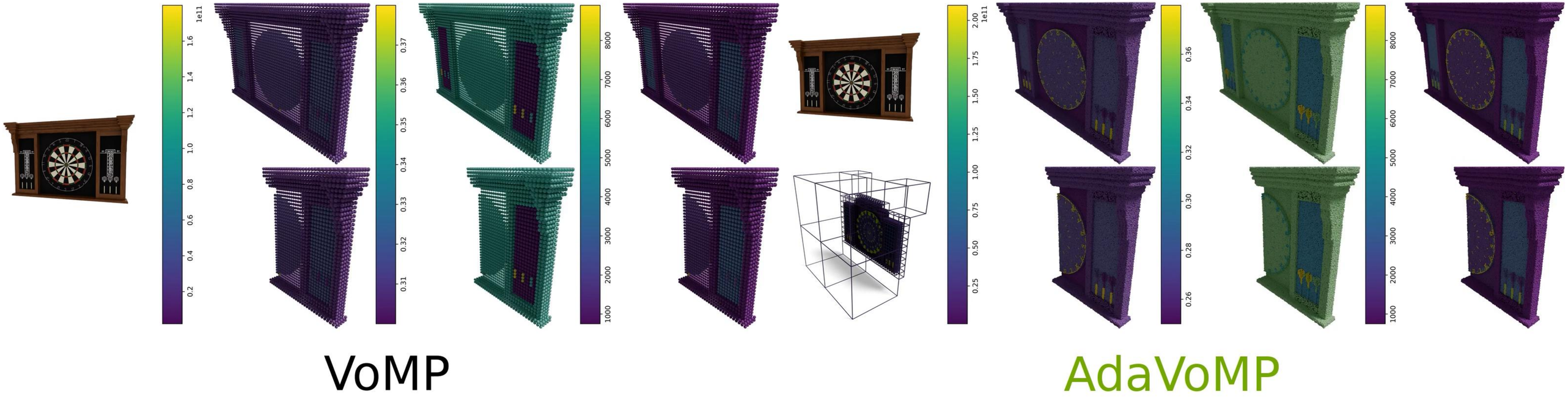


VoMP AdaVoMP Ground Truth

NeRF2Physics PUGS Phys4DGen Pixie



VoMP AdaVoMP Ground Truth



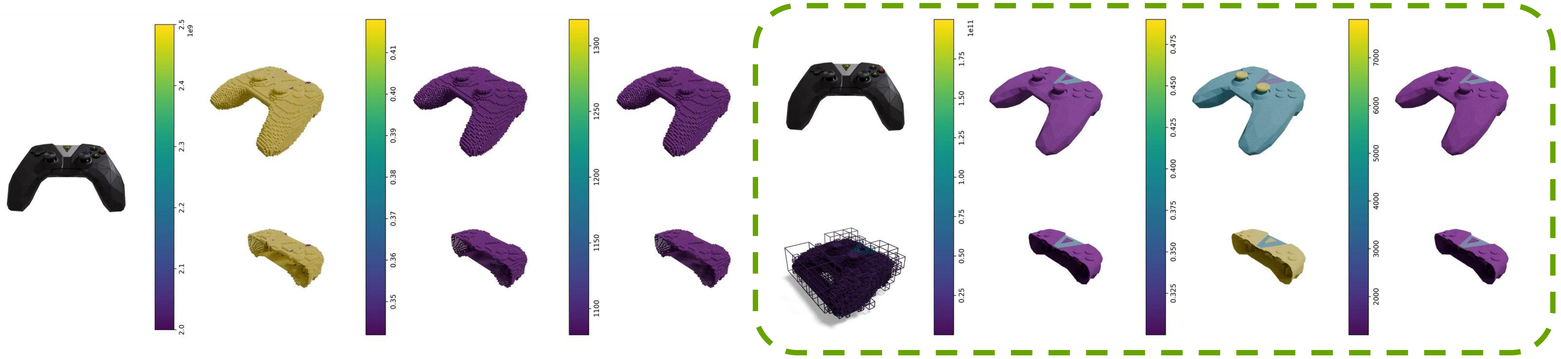
VoMP

AdaVoMP

VoMP

AdaVoMP

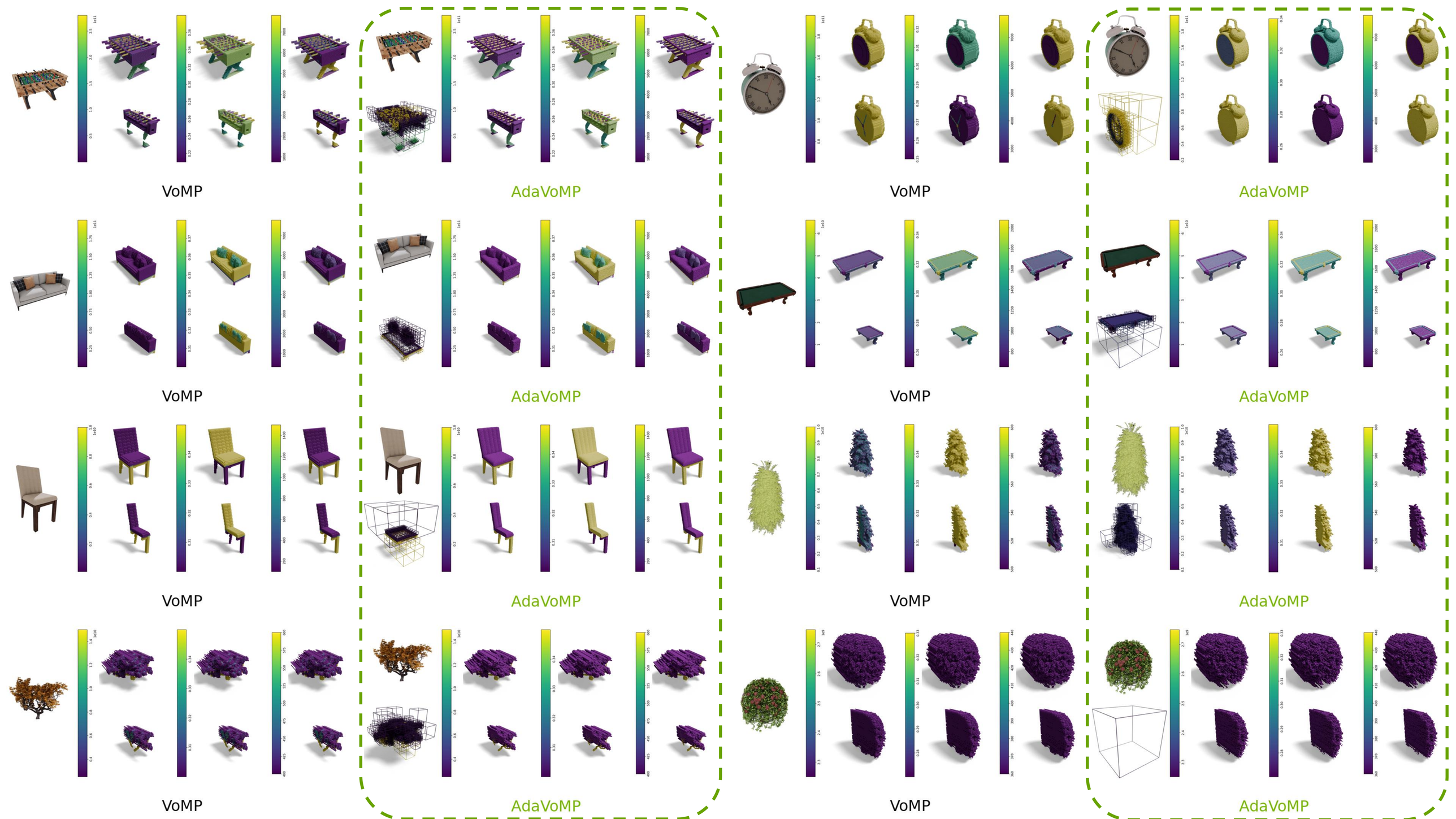
NeRF2Physics PUGS Phys4DGen Pixie



VoMP AdaVoMP Ground Truth

NeRF2Physics PUGS Phys4DGen Pixie

VoMP AdaVoMP Ground Truth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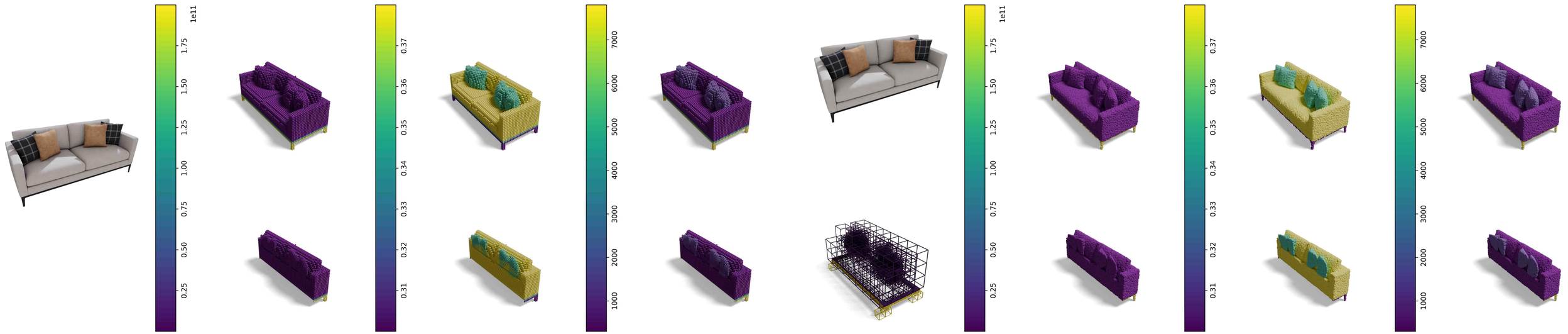

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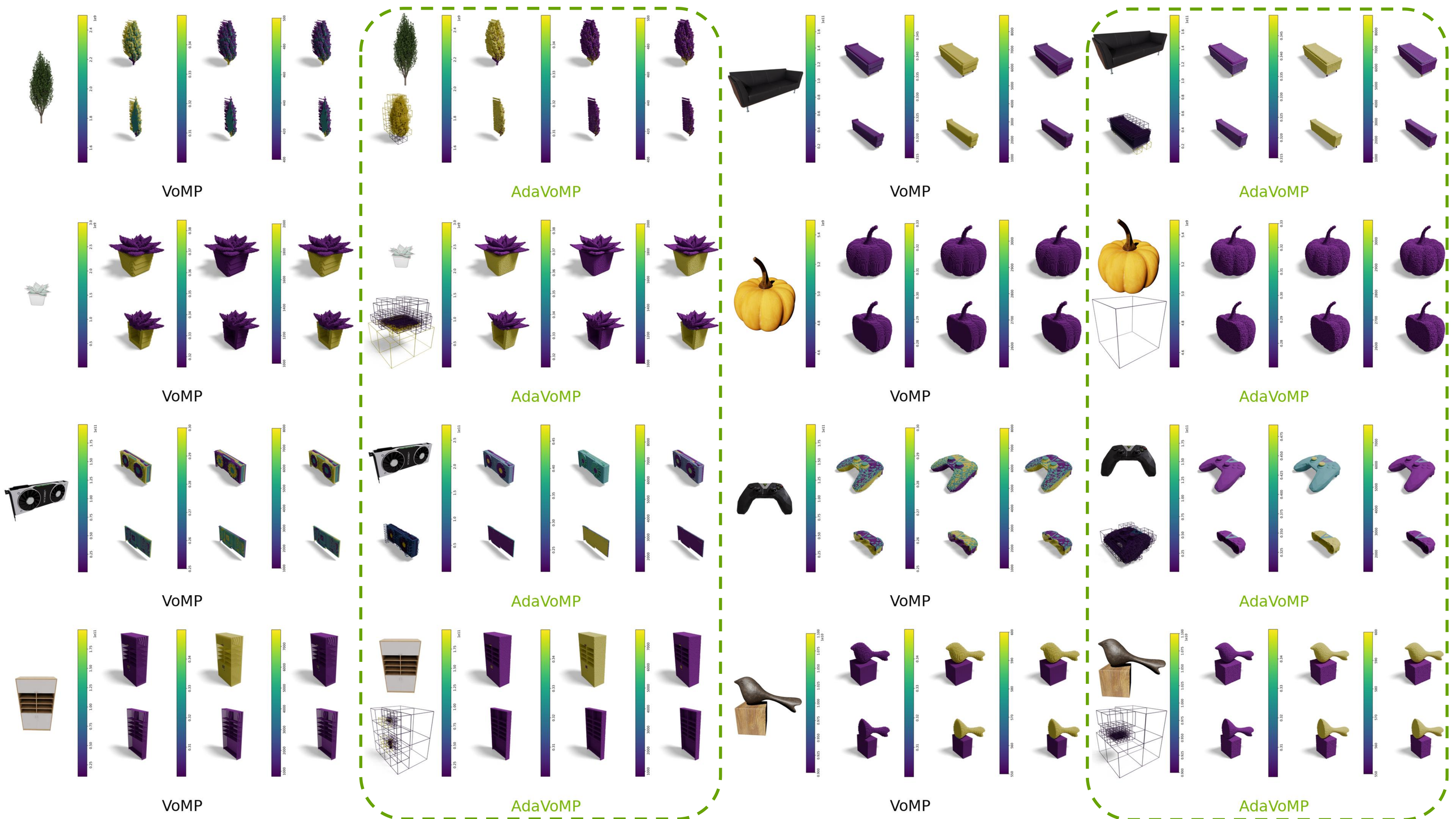
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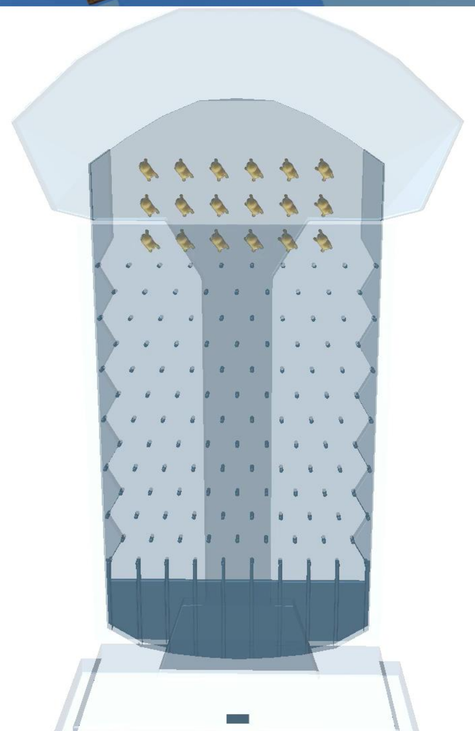
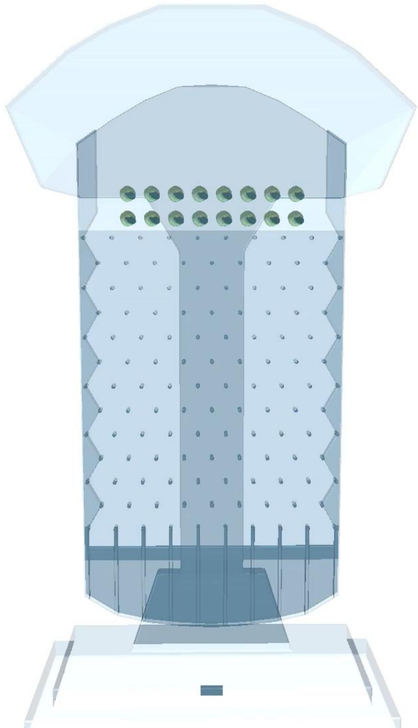
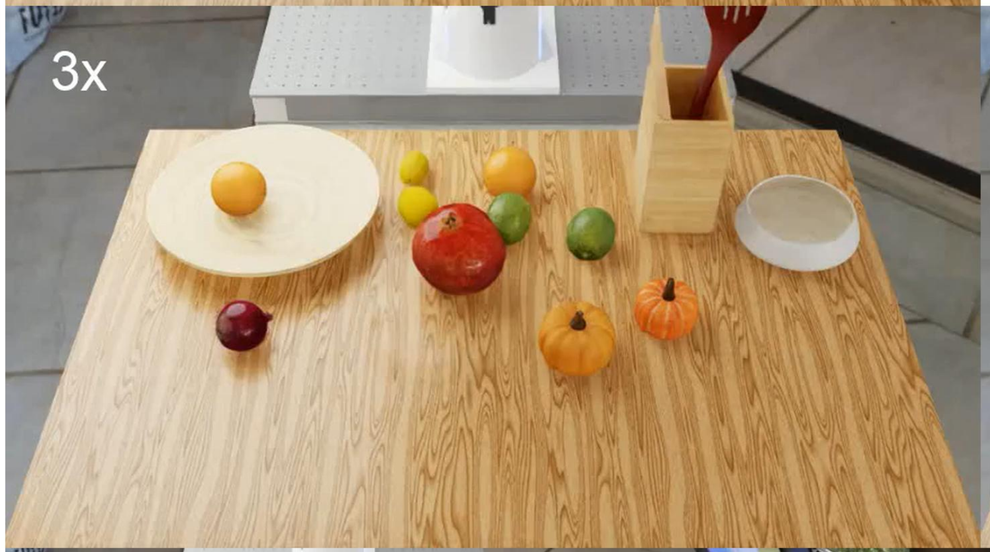
a Gaussian Splat + mesh scene turned into an interactive world, allowing a robot to interact with everything in the scene in a physically realistic way.

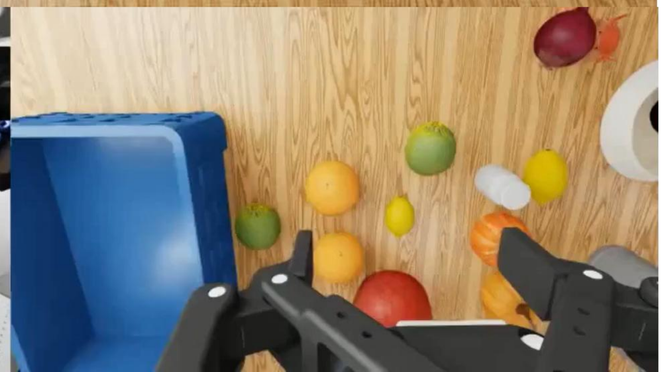
mesh and mesh + gaussian splat scenes





use with robot
evaluation frameworks





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Find more details on research.nvidia.com/labs/sil/projects/adavomp